ENERGY CENTER OF WISCONSIN

Biobased Industry in Wisconsin: Technical Report

Presentation to the Governor's Consortium on Biobased Industry
December 12, 2005

YOUR PARTNERS IN ENERGY RESEARCH, EDUCATION & CONSULTING

“Develop a leading-edge Wisconsin biorefining industry over the next 10 years”

- **Project team**
  - **Energy Center of Wisconsin**
  - **Center for Technology Transfer**
  - **Center on Wisconsin Strategy**
  - **GDS Associates**
  - **Resource Strategies, Inc.**

ENERGY CENTER OF WISCONSIN

Strategy

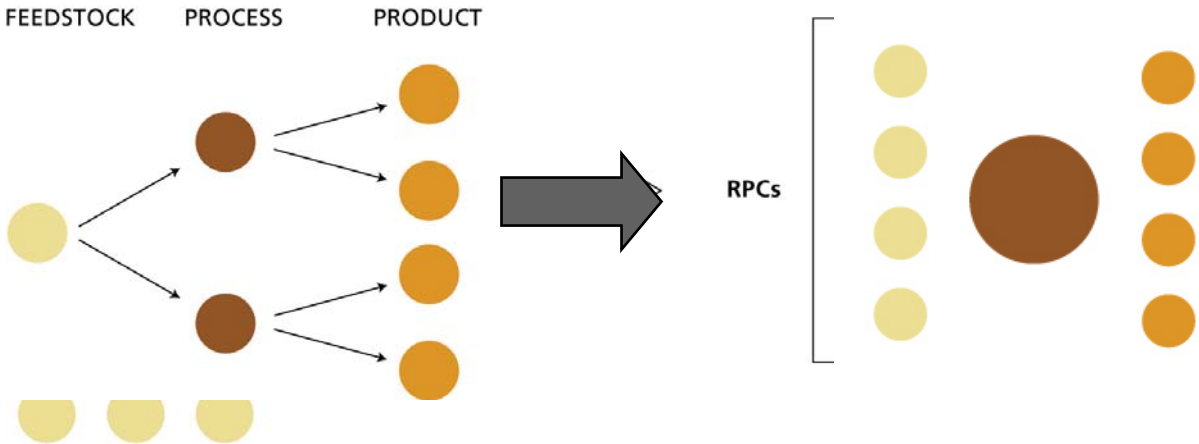
- A strategy for developing biobased industry vs. a strategy for developing biobased industry in Wisconsin
- What are Wisconsin's resources?

Wisconsin's resources

- Biomass
- Capacity
- Intellectual capacity
  - Biomass resources (crops, forests)
  - Existing facilities
  - Infrastructure

ENERGY CENTER OF WISCONSIN

Wisconsin's resources



ENERGY CENTER OF WISCONSIN

Wisconsin's resources

- RPCs and process suites answer "how"
- The question becomes: Why?
- Supply and demand

ENERGY CENTER OF WISCONSIN

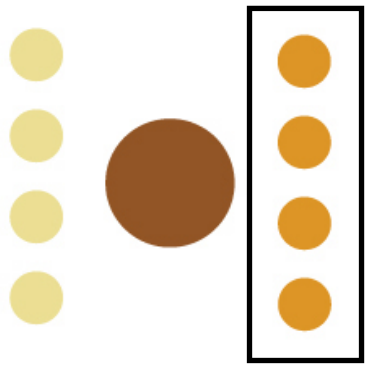
Wisconsin's resources

- Farm manure management
- Traditional crops
- Crop residues
- Forest biorefinery
- Forest residues
- Industrial waste streams

- Research & development

ENERGY CENTER OF WISCONSIN

Wisconsin's resources



- New and dedicated crops
- Biobased chemicals

ENERGY CENTER OF WISCONSIN

Wisconsin's resources

- How to analyze these channels?
  - Analytic/Comparative Research Organization and Nonquantitative Yardstick Methodologies (ACRONYMs)
    - PEST analysis
    - SWOT analysis

ENERGY CENTER OF WISCONSIN

Wisconsin's resources

- Maps/geographic data
- Location quotient analysis

ENERGY CENTER OF WISCONSIN

Conclusions

ENERGY CENTER OF WISCONSIN

Regional biorefining

- Wisconsin's diversity is unique
  - Corn and soybean production
  - Dairy and livestock
  - Forestry and pulp & paper
  - Industrial manufacturing base
- Can and should succeed with a network of facilities of varied size

ENERGY CENTER OF WISCONSIN

Manure & ethanol

- **Clearest opportunities for short-term gains**
  - **Many facilities that could benefit have not yet adopted farm manure management; if technologies make expansion possible, this will drive on-farm and external employment**
  - **Ethanol plants in operation, with potential to expand capacity and create new facilities**

ENERGY CENTER OF WISCONSIN

Forest biorefinery

- Wisconsin can lead conversion of pulp mills into forest biorefineries
  - Pulp & paper
  - Ethanol or other chemicals
  - Green power for export
- Rare opportunity to convert existing facilities into sophisticated biorefineries

ENERGY CENTER OF WISCONSIN

Research and development

- **Most important short-term action in terms of yielding long-term gains**
  - **Funding**
  - **Coordination**

ENERGY CENTER OF WISCONSIN

“Gateway” opportunities

- **Biobased transportation fuel production is the best way to position the state to enter the commodity and specialty chemicals market**
  - **Industrial base**
  - **Workforce**

ENERGY CENTER OF WISCONSIN

“Gateway” opportunities

- **Facilities that add little value to biomass can be important**
  - **Make it worth solving collection, handling problems without worrying about market risk**
  - **Once logistics are solved, operations can take on technology risk**

ENERGY CENTER OF WISCONSIN

Forest & agriculture residues

- Can be a win-win
  - Collection can encourage no-till farming and sustainable forestry management
- Lack of formal markets
- Need for further development regarding both collection and utilization

ENERGY CENTER OF WISCONSIN

New and dedicated crops

- Profitable use of nonproductive lands
- Intellectual property barriers

ENERGY CENTER OF WISCONSIN

Research and development needs

ENERGY CENTER OF WISCONSIN

Feedstock

- Densification and export of wood residues
- Methods to increase or improve biomass supplies
- Crop residue harvest, storage methods and economics

ENERGY CENTER OF WISCONSIN

Conversion technologies

- Value prior to pulping
- Smaller, modular manure management systems
- Lignocellulosic ethanol processing methods for crop residues
- Fiber composite uses for feedstocks

ENERGY CENTER OF WISCONSIN

Products

- Conversion of syngas to liquid fuel
- Non-electricity use options for biogas
- Pyrolysis oil characteristics and market opportunities
- Pyrolysis char as soil amendment

ENERGY CENTER OF WISCONSIN

Social research

- Environmental profiles of biorefining technologies
- Public, private and hybrid business models and their associated technical, legal and business issues

Contact information

Sean Weitner

Energy Center of Wisconsin

sweitner@ecw.org

608.238.4601 x114